"Note on the Anomalous Dispersion of Sodium Vapour." By W. H. JULIUS, Professor of Physics in the University of Utrecht. Communicated by C. VERNON BOYS, F.R.S. Received February 17,—Read February 20, 1902.

The importance of the study of anomalous dispersion in gases, both for testing dispersion theories and for investigating the connection of the subject with solar physics,* has induced Professor R. W. Wood to publish a highly interesting paper on the anomalous dispersion of sodium vapour.†

In most of his experiments, Wood deals with a much denser vapour than I had studied; this may be the reason that he believes he finds a difference between his views and mine about a point on which, in fact, we do agree.

On p. 160,‡ Wood describes the spectrum of electric light that has passed through a tube containing sodium vapour of increasing density, and how in a few seconds the vapour becomes so dense that total absorption of all the light between the D-lines occurs. Then he says: "Julius expresses the opinion that this disappearance of the light between the lines is only a result of the strong dispersion"; and he is of a different opinion. This, however, proves, I fear, that he really did not read my paper rightly, as he suspected might be the case (p. 169).§

Indeed, speaking of the difference in the result, obtained by Becquerel and by myself in studying the dispersion caused by a sodium flame, I suggested‖ that "perhaps Becquerel's flame contained more sodium than mine"; for I felt sure, that in a sufficiently dense vapour the absorption would extend over a broader region of the spectrum. Some lines further, alluding to the absence, in the spectrum, of the light that is strongly deflected by anomalous dispersion and thus falls outside the spectroscope, I said: "Here, then, we have a case where the absorption spectrum of a vapour exhibits broad bands not deserving the name of absorption bands"; and then . . . . "It would be worth while investigating in how far the anomalous dispersion can have influenced cases, in which broadening or reversal of absorption-lines have been observed."

So it is quite clear that I did not deny the possibility of getting

* W. H. Julius, "Solar Phenomena considered in connection with Anomalous Dispersion of Light," 'Roy. Acad. Amsterdam Proc.,' vol. 2, p. 575; 'Astron. Nachr.,' 3672.

† R. W. Wood, "The Anomalous Dispersion of Sodium Vapour," 'Roy. Soc., Proc.,' vol. 69, p. 157.

‡ *Loc. cit.*

§ *Loc. cit.*, p. 169.

‖ 'Roy. Acad. Amsterdam Proc.,' p. 578.

broad bands by absorption. I have never expressed the opinion, that the disappearance of the light between the D-lines in the absorption spectrum of dense sodium vapour is only a result of the strong dispersion; but I warned against always ascribing the observed dark bands to absorption only.

Wood's recent researches are very important as a contribution to our knowledge of dispersion in general. For the present their bearing on the spectral phenomena exhibited by the light from the chromosphere and from sun-spots, seems not to be so direct, because, most probably, the density of the vapours is much less in the solar atmosphere than in the dispersion tubes used by Wood in his brilliant experiments.

"On the Increase of Electrical Resistivity caused by Alloying Iron with Various Elements, and the Specific Heat of those Elements." By W. F. BARRETT, F.R.S., Professor of Experimental Physics in the Royal College of Science for Ireland. Received December 16, 1901—Read February 6, 1902.

In the following note I wish to draw attention to a connection which appears to exist between the electric conductivity of certain alloys of iron and the specific heats, and hence atomic masses, of the particular elements with which the iron is alloyed. In a paper published in the 'Transactions' of the Royal Dublin Society the electric conductivity and magnetic permeability of a very large and, I believe, unique collection of alloys of iron is given.* These alloys, it may be mentioned, have been prepared with great care by my friend, Mr. R. A. Hadfield, Managing Director of the Hecla Steel Works, Sheffield. Of the alloys made, 110 different specimens were found homogeneous, and could be forged and rolled; these were analysed at the Hecla works, and submitted to similar heat treatment—all being carefully annealed under the direction of Mr. Hadfield.

The specimens were in the form of rods, of nearly circular cross-section, about one-half a centimetre in diameter and 104 cms. long. The conductivities were found by the potential method, a standard of pure copper being employed. Although the determination of the mean sectional area of the specimens was made with great care, by numerous measurements of each rod with a micrometer screw, and also by means of water displacement, yet, owing to slight irregularities in the diameters of the rods, and the numerical importance of this value in

* "On the Electrical Conductivity and Magnetic Permeability of Various Alloys of Iron," by W. F. Barrett, F.R.S., W. Brown, B.Sc., and R. A. Hadfield, M.Inst. C.E., 'Trans. Royal Dublin Society,' January, 1900.